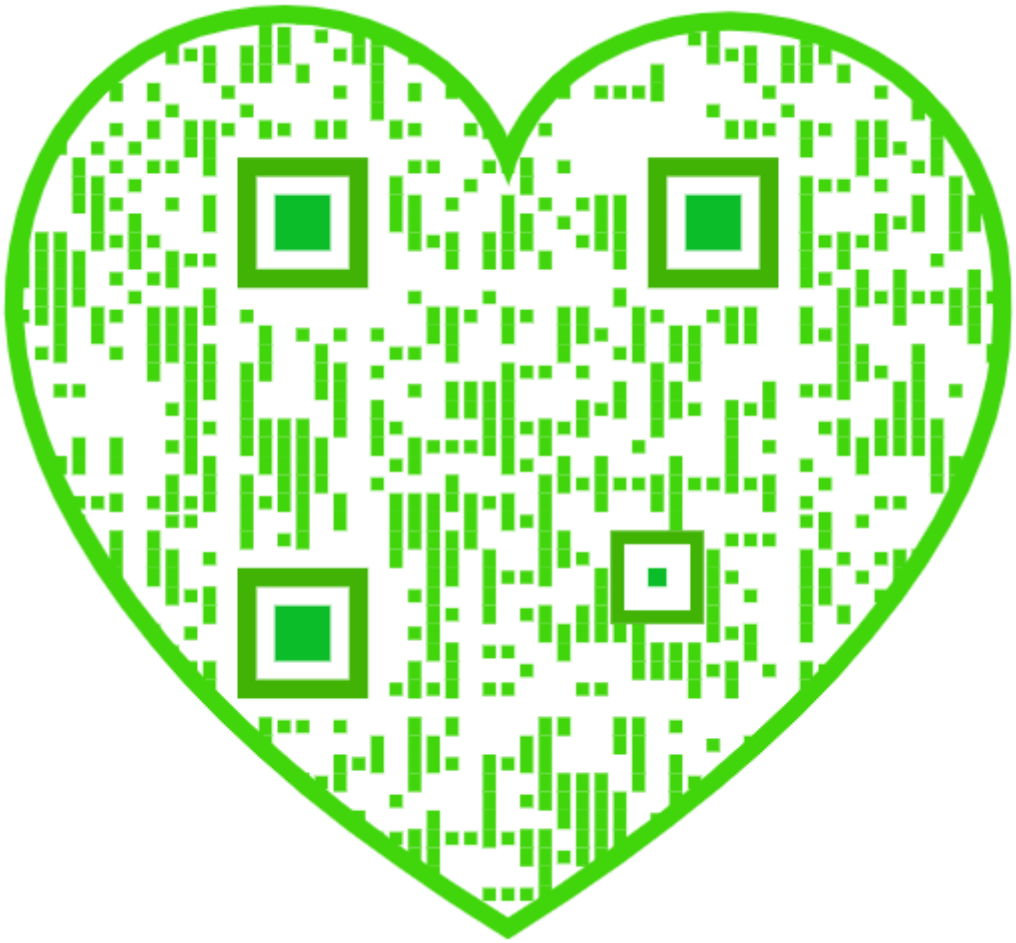

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NEW METHODS IMPROVE TURPENTINE

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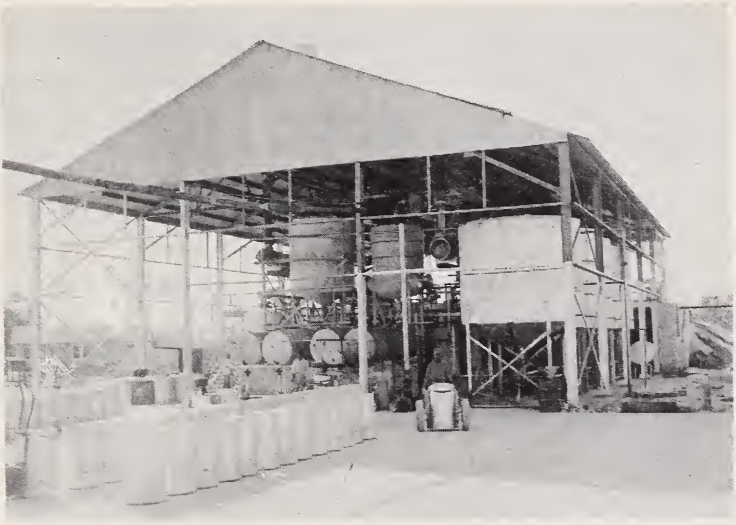

Agricultural Research Administration
BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY
Naval Stores Research Division

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Cover.--Modern plant using the "Olustee System" for pine gum cleaning and steam distillation. (Courtesy Jacksonville Processing Co., Jacksonville, Fla.)

NEW METHODS IMPROVE TURPENTINE

BETTER PROCESSING AND DISTILLATION PRACTICES YIELD LOW-ACID PRODUCT

By

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Gum spirits of turpentine for decades has been marketed with color and specific gravity as the principal standards of acceptance. Recently, another property of turpentine, its acidity, has become an important market factor. Just as colored turpentine is obviously contaminated and a low specific gravity indicates adulteration, the acidity of turpentine can be a test of its behavior during storage or transportation.

Excessive acidity in turpentine is troublesome to processors because it promotes deterioration during storage and causes discoloration of turpentine packed for shipping in steel drums or tank cars. Highly acid turpentine is objectionable to consumers also because of this poor storage quality and reaction with metals. Consumers will demand turpentine of lower and lower acid content or they will go over to the use of materials

that do not present those difficulties. So important has acidity become that the Government has established the limits on the acidity of turpentine acceptable in the Commodity Credit Corporation price support program.

Excessive acidity in turpentine is due to faulty operation at some stage of processing. It is not due, as many think, to acid stimulation of the tree to increase the flow of gum. Gum spirits of turpentine, when properly produced, is very low in acids. Acidity may be caused by one or more of the following conditions during processing:

(1) Stilling gum with high water content

(2) Overcharging the still

(3) Too rapid distillation

(4) Permitting the still to boil over

(5) Continuing the distillation beyond the normal end point

(6) Poor dehydration of the turpentine

HOW TO MAKE LOW-ACID TURPENTINE

By observing proper procedures for cleaning and distilling gum, turpentine with relatively low acidity can be produced at the still. For example, use of a vapor chamber

between the condenser and the still is a great aid in reducing acidity. The proper procedures follow.

GIVE THE WASHED GUM TIME TO SETTLE

Gum being charged into the still should be as dry as possible -- preferably, not over 2 percent water, to reduce foaming and the possibility of a boilover when distillation is begun. This low water content can be obtained by proper washing and settling after the filtration in the gum-cleaning operation.

To get a good separation of gum from water in the wash tank, the gum must be lighter than water. This requires dilution with turpentine up to about 35 percent. Crude gum as received contains about 20 to 22 percent turpentine (11 to 12 gallons spirits per standard barrel of gum). To accomplish the dilution for good gum-water separation in the wash tank requires the addition of about 10 to 12 gallons of turpentine per barrel of gum. Scrape contains much less turpentine, ranging from about 7 to 9 gallons per barrel. Obviously, scrape requires much more turpentine for dilution to 35 percent. Sixteen to 18 gallons of turpentine should be used for dilution of each barrel of scrape. To get good gum-water separation it is important not to skimp on the amount of turpentine used for dilution.

To get good settling, adjust the temperature within the wash tank to about 180° F. when the wash tank is filled. The gum should

remain in the wash tank for at least 4 hours, preferably longer. The temperature within the wash tank will normally drop from 180° to about 160° during this time, but with proper dilution a good separation of water from the gum will be obtained.

With this procedure the filtered, washed, and settled gum will not have more than about 1 percent water. Gum containing this small amount will not foam badly or cause boilovers.

DO NOT OVERCHARGE THE STILL

Charge the still over two-thirds full so that one-third of its volume remains as head room for boiling. Overcharging should be avoided.

DO NOT DISTILL TOO RAPIDLY

Each steam still is designed for a certain capacity. An experienced stiller who has become accustomed to a certain still knows how fast his still can be operated. Exceeding this speed will result in gum entrainment, or even in boilovers, and will produce highly acid turpentine.

When the still is loaded, turn on the steam coils slowly, and then gradually bring the temperature of the gum up to about 235° F. When this temperature is reached, gradually turn on sparger steam. If the temperature drops after the sparger steam is added, cut off the sparger until the gum again reaches 235° F. before turning on sparger again. If the still is properly run, the temperature of

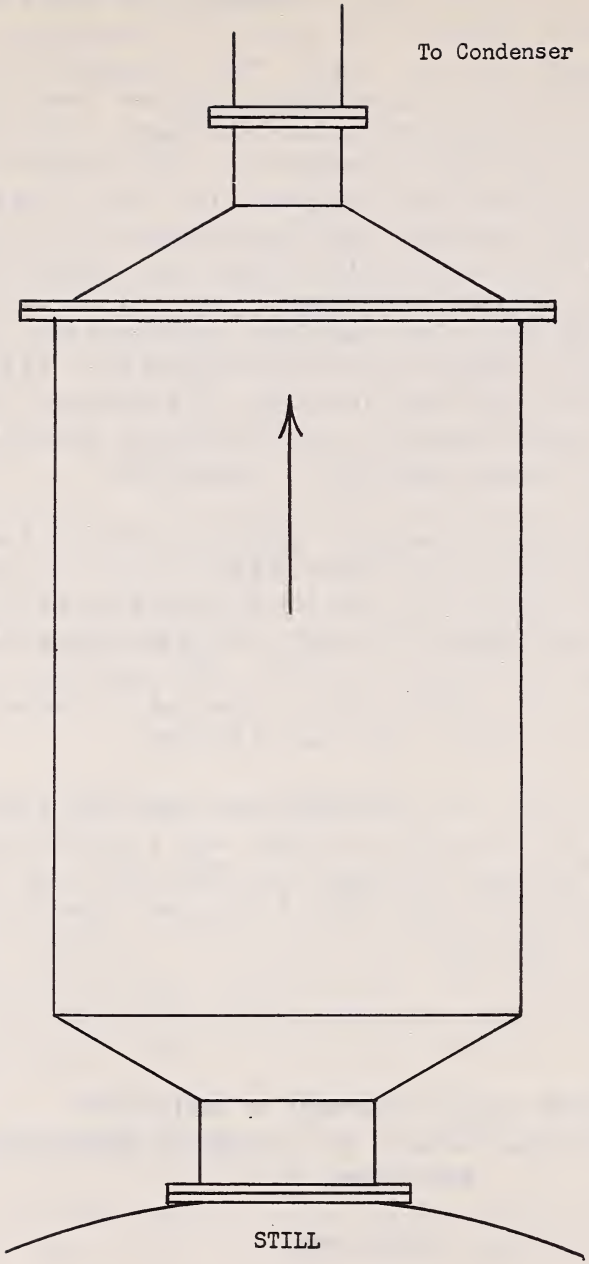
the gum will gradually increase from the time the coils are turned on until the charge is off.

DO NOT PERMIT BOILOVERS

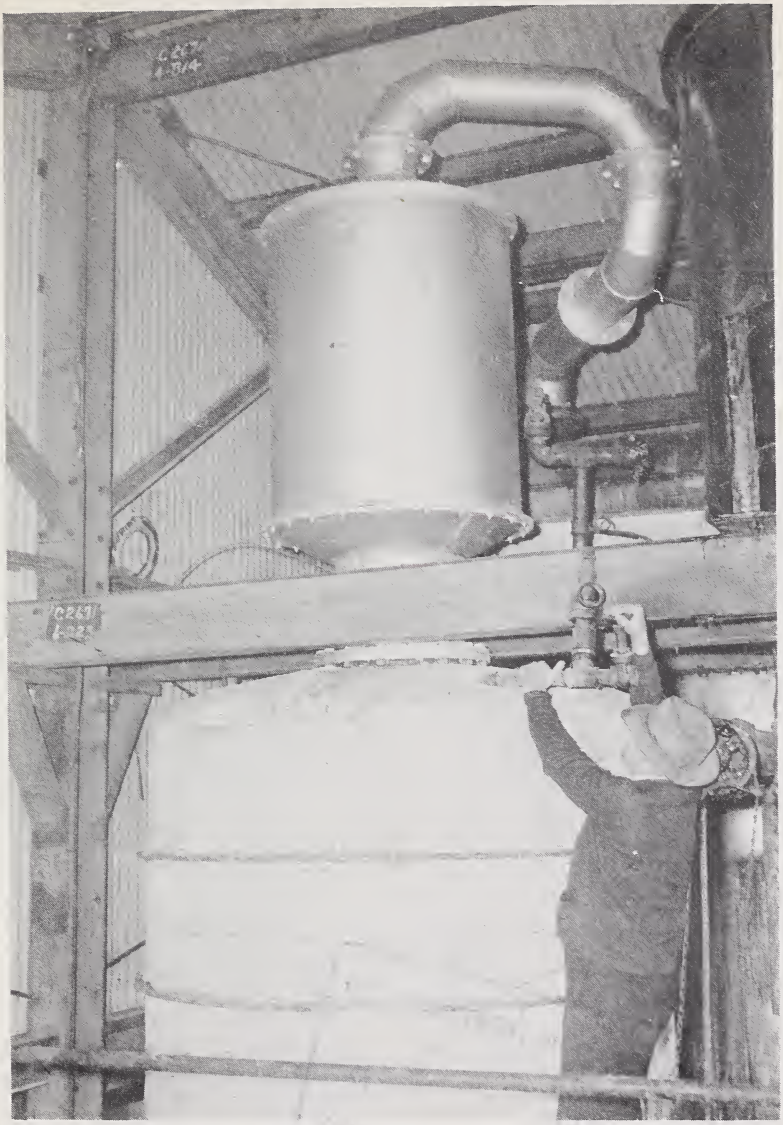
Boilovers will not occur if the still is properly charged and if distillation is properly controlled. A boilover will produce poor quality turpentine of high specific gravity, off color, and high acidity. A boilover that is permitted to run into a tank of turpentine will increase its acidity enormously. Suppose, for example, that a tank contains 1,000 gallons of turpentine with an acid number of 0.5 and that a boilover of only 10 gallons of gum occurs and is run into the turpentine tank. This boilover of only 10 gallons will increase the acid number of the whole 1,000 gallons from 0.3 to approximately 2.

DO NOT CARRY THE DISTILLATION TOO FAR

Do not continue distillation beyond the normal turning-out point as this will carry over excessive amounts of resin acids, which are dark and high in acidity. When the turpentine in the distillate reaches the 9- to 9-1/2-ounce mark on a 10-ounce nursing bottle, or a ratio of 9 to 1 or 9-1/2 to 1/2 in any measuring container, and the temperature of the rosin in the still reaches 320-340° F., the distillation is complete. At this point the steam coils and sparger should be cut off, and the rosin discharged from the still.



VAPOR VELOCITY REDUCTION CHAMBER



Velocity reduction chamber mounted in the vapor line between the turpentine steam still and condenser. This chamber is about 4 feet in diameter and 6 feet high and serves to reduce the velocity of vapors, permitting the resin acids to drop back into the still producing higher quality turpentine.